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Dietary Antioxidant Supplementation Enhances Aged Skeletal Muscle Adaptability to Repeated Exposures of Stretch-Shortening Contractions: 850: 2:15 PM - 2:30 PM

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We have shown in previous studies that aging impairs the ability of skeletal muscle to adapt to repetitive mechanical loading.

PURPOSE: To determine whether dietary antioxidant administration enhances the ability of aged skeletal muscle to adapt to repeated exposures of maximal stretch-shortening cycles (SSCs).

METHODS: Nine Fischer 344 x Brown Norway rats (30 months of age) were randomly assigned to a Vitamin E (30,000 I. U.) and C (2% by weight) supplemented group (N = 4), or Curcumin group (1% by weight) (N = 5). Dorsiflexor muscles of the left limb in all animals were exposed 3 times per week for 4.5 weeks to a protocol of 80 maximal SSCs (60 deg/s, 50 deg range of motion, 14 exposures) per exposure in vivo. Performance was characterized by isometric performance, peak eccentric force, and negative and positive net work.

RESULTS: The isometric force did not change from the 1 st to the 14th exposure for either the Vitamin E and C group or the Curcumin group. Peak eccentric force of the Vitamin E and C and Curcumin groups also did not change during this period. During this 4.5 week period, the isometric force and peak eccentric force responded similarly between groups. In addition, the ability of muscle to perform positive work and negative work was not statistically different with the type of supplementation. Thus, performance of both groups was unaffected by repeated administration of SSCs during the 4.5 week exposure period. Previously, in a study using the same exposure paradigm, we observed a significant decline in all performance parameters (p <0.05), except negative work, from the initial to the final exposure in 30 month old male rats.

CONCLUSIONS: Dietary supplementation of antioxidants appears to enhance the ability of aged skeletal muscle to adapt to repeated SSC exposures, which have previously caused mal-adaptation in aged skeletal muscle. These findings indicate that enhancing the ability of aged skeletal muscle to manage oxidative stress may promote muscle adaptation and maintenance of performance during repetitive mechanical exposures.

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